gene found that actually would retard the development of breast tumors—and it seems to do that," said Anne Bowcock, a breast cancer researcher and associate professor of pediatrics at the University of Texas Southwestern Medical Center in Dallas. "I think it's a significant step toward the treatment of at least some breast cancers." Most of the 184,000 new breast cancer cases diagnosed annually are not the inherited type. But the new research suggests that the protein produced by normal *BRCA1* genes may be effective against the more common noninherited forms of breast cancer.

Researchers led by Jeffrey Holt of Vanderbilt first implanted normal *BRCA1* genes into human breast and ovarian cancer cells and found that cell growth was inhibited *in vitro*. Next, the researchers stably transferred either normal or mutant *BRCA1* genes into breast cancer cells and injected the cells into mice. Tumors developed in all 15 mice given mutant *BRCA1*, but in none of the 20 mice given normal *BRCA1*. Finally, the researchers injected viruses carrying the *BRCA1* gene into the abdomens of 10 mice with established breast cancer tumors; half the mice got normal *BRCA1*, the others got mutated *BRCA1*. The mice with mutant *BRCA1* all died of cancer within two weeks. Those with normal *BRCA1* survived 15 to 41 days, and their tumors either shrank or disappeared.

All the experiments used a cell line derived from noninherited breast cancer, suggesting that the treatment might work against the more common types of the disease. Against hereditary breast and ovarian cancer, "presumably it would have an even more dramatic effect—at least that's what we hope," said Roy Jensen, an assistant professor of pathology and cell biology at Vanderbilt.

Translating the results into treatments for human cancers will take time. "It's going to be a long time before this is taken to the bedside," said Bowcock. "The problem is actually getting *BRCA1* into breast cells—it's not going to be easy."

It's easier to get *BRCA1* into ovarian tumor cells, and Vanderbilt researchers recently began clinical trials using *BRCA1* on about 20 ovarian cancer patients, a move that concerns some of their colleagues. While he finds the results of the mouse and cell culture experiments "intriguing" and "encouraging," Roger Wiseman, head of the Comparative Carcinogenesis Group of the NIEHS Laboratory of Molecular Carcinogenesis (part of the team that identified *BRCA1*) feels the human gene therapy trials are "premature, based on the data that have been presented so far." Wiseman would like to see more animal studies performed before *BRCA1* is used in patients.

A related study led by Jensen found evidence that the BRCA1 protein may be secreted and do its work outside the cell. If this is true, it would be much easier to design and deliver drugs that mimic the protein's effects. However, this finding is controverted, and other research groups are convinced that the BRCA1 protein works from inside cells.

"What we need to do to confirm our theory is purify recombinant *BRCA1* and put it onto cells and see if it actually has a growth inhibitory action," said Jensen. If it does, and if it works only on breast and ovarian cancer cells and not other cells, "then that's pretty good evidence that there are specific receptors for this protein. Our efforts then would be focusing on trying to find those receptors."

EHPnet

Genetics and Biosafety

With the pounding pace at which research in genetics and biotechnology is progressing, it has become increasingly difficult for scientists to stay abreast of all the advances and ensure that the new technology is being used in a safe and cautious manner. In an effort to improve communications among scientists and promote the safe use of biotechnology, the United Nations established the International Centre for Genetic Engineering and Biotechnology (ICGEB).

The center maintains two main research laboratories, one in Trieste, Italy, and another in New Delhi, India, with several other smaller labs scattered around the world. These laboratories distribute their findings along with other biology-related information over the Internet via the ICGEB home page and ICGEBnet, an information resource network for molecular biologists.

The ICGEB home page, located at **http://base.icgeb.trieste.it/**, provides information on ICGEB-sponsored meetings and symposia, access to biology-related databases and newsgroups, and information on accessing ICGEBnet. A second biology-related network available from the home page called BIN21 is still being developed by the ICGEB and will focus on issues of biodiversity.

Among the databases accessible from the ICGEB's home page is one relating to P450 proteins and P450-containing systems, an on-line directory of biologists around the world, and SBASE (a sequence database of protein domains). An extensive library of biosafety-related rules and regulations from various nations, organizations, and research institutions is also available, along with lists of experts and databases that can be contacted to help researchers in dealing with biology-related legal issues. For further assistance on biosafety and legal questions, a link is provided to the Stockholm Environment Institute's Biotechnology Advisory Board home page. This international board of scientists will answer questions and give advice on any issue relating to ecology, biochemistry, genetics, biotechnology, pathology, environmental law, or economics.

Access to ICGEBnet and BIN21 will be free of charge but generally limited to scientists and policymakers with a pertinent interest in biology. Currently, ICGEBnet gives scientists around the world access to a variety of databases and provides a computer environment that allows molecular biologists to analyze nucleotide and protein sequences. Analysis software, including three major program packages, is distributed over ICGEBnet. In addition, information services such as electronic mail and bulletin boards are also available. The center's goal is to distribute these services to areas of the developing world where they are not yet widely available.

Fueling the Gas Debate

New findings continue to fuel the debate over the safety and effectiveness of gasoline additives, such as methyl tertiary butyl ether (MTBE) and ethanol, being used to reduce air pollution. The Clean Air Act Amendments of 1990 required that, beginning in 1992, areas that fail to meet air quality standards must use oxygenated fuels. Not only has the effectiveness of the oxygenates in reducing carbon monoxide (CO) emissions been questioned, the additives have also been accused of causing health problems including headaches, dizziness, nausea, and rashes. However, a recent study has found that the additives are successful in reducing CO emissions and do not appear likely to substantially increase health risks when compared to normal gasoline. The report